

Appendix A

Worksheets and Text passages

Reading passage:

Answer the questions: What are the types of substances involved in a chemical reaction? Where are they located in a chemical equation? What must happen for **reactants** to be changed into **products**?

- Two types of substances are involved in all chemical reactions.
 - **Reactants** are the substances present at the beginning of a chemical reaction. When natural gas burns, for example, the reactants are methane (CH_4) and oxygen (O_2).
 - **Products** are the substances formed by the chemical reaction. When natural gas burns, the bonds holding the methane and oxygen molecules together break apart, and new bonds form to produce carbon dioxide (CO_2) molecules and water (H_2O) molecules. Carbon dioxide and water are the products of the reaction.

Reactants and Products

Reactants are the substances present at the beginning of a chemical reaction. In the burning of natural gas, for example, methane (CH_4) and oxygen (O_2) are the reactants in the chemical reaction. **Products** are the substances formed by a chemical reaction. In the burning of natural gas, carbon dioxide (CO_2) and water (H_2O) are the products formed by the reaction. Reactants and products can be elements or compounds, depending on the reaction taking place.

During a chemical reaction, bonds between atoms in the reactants are broken and new bonds are formed in the products. When natural gas is burned, bonds between the carbon and hydrogen atoms in methane are broken, as are the bonds between the oxygen atoms in oxygen molecules. New bonds are formed between carbon and oxygen in carbon dioxide gas and between hydrogen and oxygen in water vapor.

Reactants—bonds broken

methane + oxygen
(CH_4) (O_2)



Products—new bonds formed

carbon dioxide + water
(CO_2) (H_2O)

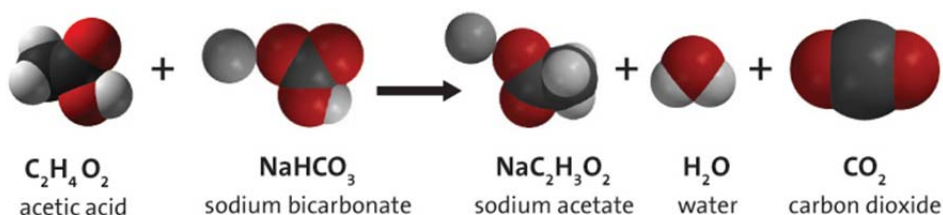


What must happen for reactants to be changed into products?

(McDougal Littell, 2005)

Balancing Chemical Equations Worksheet 1

Directions: count how many atoms of each element is on each side of this Equation



Na (sodium) = _____

H (hydrogen) = _____

C (carbon) = _____

O (oxygen) = _____

Na (sodium) = _____

H (hydrogen) = _____

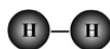
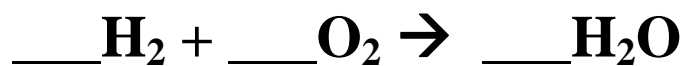
C (carbon) = _____

O (oxygen) = _____

The law of the **Conservation of Mass** states that in a closed system, mass is neither created nor destroyed. A **chemical equation** is **balanced** when the number of the same kind of atoms in the **reactants** is equal to the number of the same kind of atoms in the **products**. Is this **chemical equation balanced**?

Worksheet #1part 2

Now model this equation:



H = _____

O = _____

H = _____

O = _____

Is it **balanced**? What do you need to do to balance it?

Write the product(s) of this equation

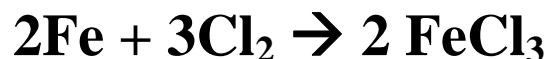
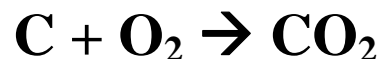
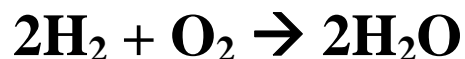
_____.

Hydrogen and oxygen are _____ of this equation.

Balancing Chemical Equations

(directions – write these on separate pieces of paper for students to model. There are models of the molecules provided on the next page.) Students who need a challenge can be given unbalanced equations and be asked to balance them.

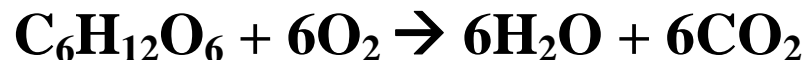
Reactant → Product



Photosynthesis:

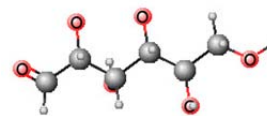
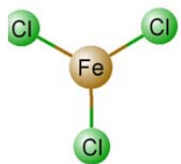
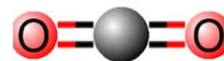
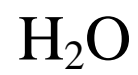


Respiration



Configurations from NIH website: (United States National Library of Medicine, 2006)

http://chem.sis.nlm.nih.gov/chemidplus/ProxyServlet?objectHandle=DBMaint&actionHandle=default&nextPage=jsp/chemidheavy/ResultScreen.jsp&ROW_NUM=0&TXTSUPERLISTID=0007782505



Nails in a Jar

Jake put a handful of wet, iron nails in a glass jar. He tightly closed the lid and set the jar aside. After a few weeks, he noticed that the nails inside the jar were rusty. Which sentence best describes what happened to the total mass of the sealed jar after the nails rusted?



- A** The mass of the jar and its contents increased.
- B** The mass of the jar and its contents decreased.
- C** The mass of the jar and its contents stayed the same.

Select the answer that best matches your thinking. Explain what happened to the mass before and after the nails rusted.
